REDISCOVERING CURIOSITY AMONG SWANS AND TREES

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I am a professor and a researcher, working at the interface between Ecology and Evolutionary Biology at the University of Lisbon. My work is anchored in laboratory experiments using herbivorous spider mites, which are elaborated, performed, and interpreted together with a team of excellent students and researchers. I address questions related to sexual selection, sex allocation, competition, and host-parasite interactions, often using the powerful tool of experimental evolution. I strongly believe that science is a cooperative endeavour and invest in activities that benefit the scientific community. I thus play active roles in national and international scientific societies, having just been elected President of the European Society for Evolutionary Biology. I also act as a reviewer for journals and for grant schemes on a regular basis, being part of the Editorial Board of several journals (currently *American Naturalist* and *Evolution*). Although I consider fundamental research a societal priority, I am also devoted to bringing science closer to society. In particular, I conduct initiatives aiming at building bridges between researchers, producers, and consumers committed to sustainable agriculture. – Address: Centre for Ecology, Evolution and Environmental Changes, University of Lisbon, Edifício C2, 3o Piso, Campo Grande, 1749-016 Lisbon, Portugal. E-mail: snmagalhaes@fc.ul.pt.

The academic year I had at the Wissenschaftskolleg zu Berlin was one of the best years of my life in several ways, and one that I predict will have long-lasting repercussions on the way I conduct my work and envision the world in general.

1. I learned the most

I attended most of the Colloquia and listened to recordings of those that took place during the rare weeks I was away from Berlin. In addition, I joined the meetings of the History and Philosophy of Science discussion group and the Writers Anonymous group. I attended the Three Cultures Forums and actively participated in one ("What is a Community?"). I also hosted a table discussion at the Berliner Abend ("The Ecology of Conflict") and took part in several events organized either in-house or by Fellows in the city. I read articles, books, and book chapters authored by several of my colleagues. I also joined most lunches and dinners, where I consistently had highly stimulating conversations with Fellows and, occasionally, their guests. By the end of the year, I had interacted with all Fellows. These exchanges have enriched me in ways that are difficult to express. I had not imagined that there could be a place where one could learn so much, across such a wide range of topics and in such a pleasant and engaging atmosphere. I believe the intellectual and human qualities of my colleagues played a key role in making this experience so rewarding. I also take from this year a bunch of people that will hopefully continue to be present in my life, which is something I didn't really expect at this stage.

2. I finished long-standing research

Being at the Wissenschaftskolleg gave me the time and mental disposition to finish work that had been lingering on for a significant amount of time. It is not the quantity of articles that I managed to finish this year, but their nature that was special. For example, I wrote one manuscript with data that we had collected eight years ago. The topic is a fascinating one (whether traits associated with density-dependent environments trade off with those associated with non-saturated ones), but one that has been out of the scope of the research conducted in my lab. To delve into that, I had to go back to a whole body of literature I was no longer familiar with. I somehow hadn't found the mental space to do this before coming here. To my great relief, I completed the manuscript and submitted it.

Moreover, thanks to the generosity of the Kolleg, I hosted several academic guests during the year. These meetings were instrumental in bringing together colleagues from different parts of the world to work in the wonderful setting of Grunewald. During those visits, we were able to work intensively on the elaboration of a project and on completing manuscripts. This would not have been possible (or it would have been much slower and exhausting) had we not had the opportunity to meet in this setting.

3. I developed my Wiko project

The project I originally proposed for this year evolved significantly over the first half of the year, ultimately crystallizing into a conceptual article titled "The Ecology and Evolution of Interactions: Finding Common Processes and Identifying Knowledge Gaps." In this article, I develop a unifying framework to analyse all ecological and evolutionary interactions—predator-prey, host-parasite, competition, and male-female interactions—that are traditionally studied in isolated domains with limited cross-communication.

By integrating insights from both ecology and evolutionary biology, I classify interactions along three key axes: *Specificity* (the range of resource types that an interactor consumes), *Dependence* (the number and consistency of partners an individual interacts with over its lifetime), and *Impact on Fitness* (the degree to which interactions increase or decrease the fitness of interactors). These axes allow for a dynamic understanding of interactions, which may shift along the spectrum or even change categorical identity (e.g., competition becoming cooperation) depending on the strength and symmetry of these dimensions.

The article proceeds to examine organismal responses to interactions, organizing them under three core processes: *avoid*, *adjust*, and *adapt*. I then explore the *emergent outcomes* of these interactions for species distributions (e.g., priority effects, coexistence, exclusion), individual fitness (e.g., alignment of interests, negative frequency-dependent selection, character displacement), and the environment (e.g., niche construction).

Finally, the article highlights key *knowledge gaps*—instances in which processes well-documented in one domain of interaction literature are absent or underexplored in others. While the conceptual framework is now fully developed, I am currently in the process of writing the manuscript.

4. I collaborated with researchers from other areas on a common article

As a spin-off of the History and Philosophy of Science discussion group, a shared interest emerged among three of us—Jutta Schickore, Mariana Gómez-Schiavon, and me—leading to a collaborative writing project. Our forthcoming manuscript, titled "Harnessing Complexity May Strangle It: What Is a Well-Controlled Experiment?", explores the concept of control in scientific experimentation. We argue that excessive control can sometimes obscure key features of complex systems, thereby limiting scientific insight.

Our different backgrounds have led us to this problem via different paths. Jutta is a philosopher of science who has written important pieces on the notion of control throughout the history of science, Mariana is a biologist who uses mathematical modelling to

understand the functioning of the cell, in particular the emerging properties of regulatory networks, and I am an evolutionary biologist used to performing large-scale, highly controlled experiments in the laboratory. Together, we bring complementary approaches to this discussion.

This manuscript is currently under review.

5. I found a new way of working

All these endeavours have certainly contributed to my career in meaningful ways. However, the most important impact this year has had on my professional life is immaterial—and therefore difficult to articulate. The academic world often traps us in a success fallacy: as our visibility grows, so do our responsibilities. We are called upon to serve our institutions and the broader community with grant evaluations, conferences, editorial duties, and more. These roles, while important, consume so much of our time that we risk losing sight of why we chose this path in the first place. This year reminded me of the importance of carving out time for what scientists should ultimately strive for: open-ended, curiosity-driven research.